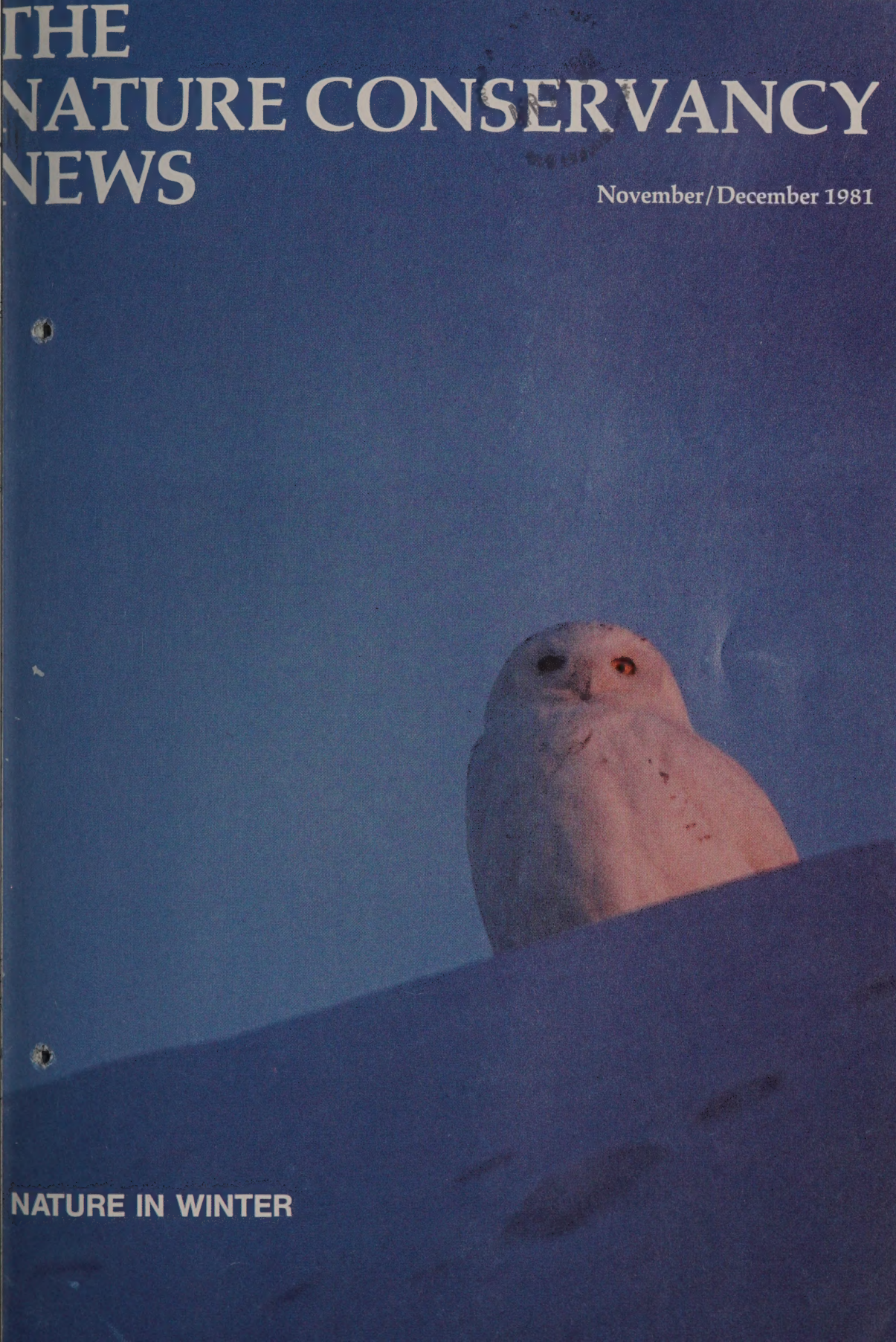
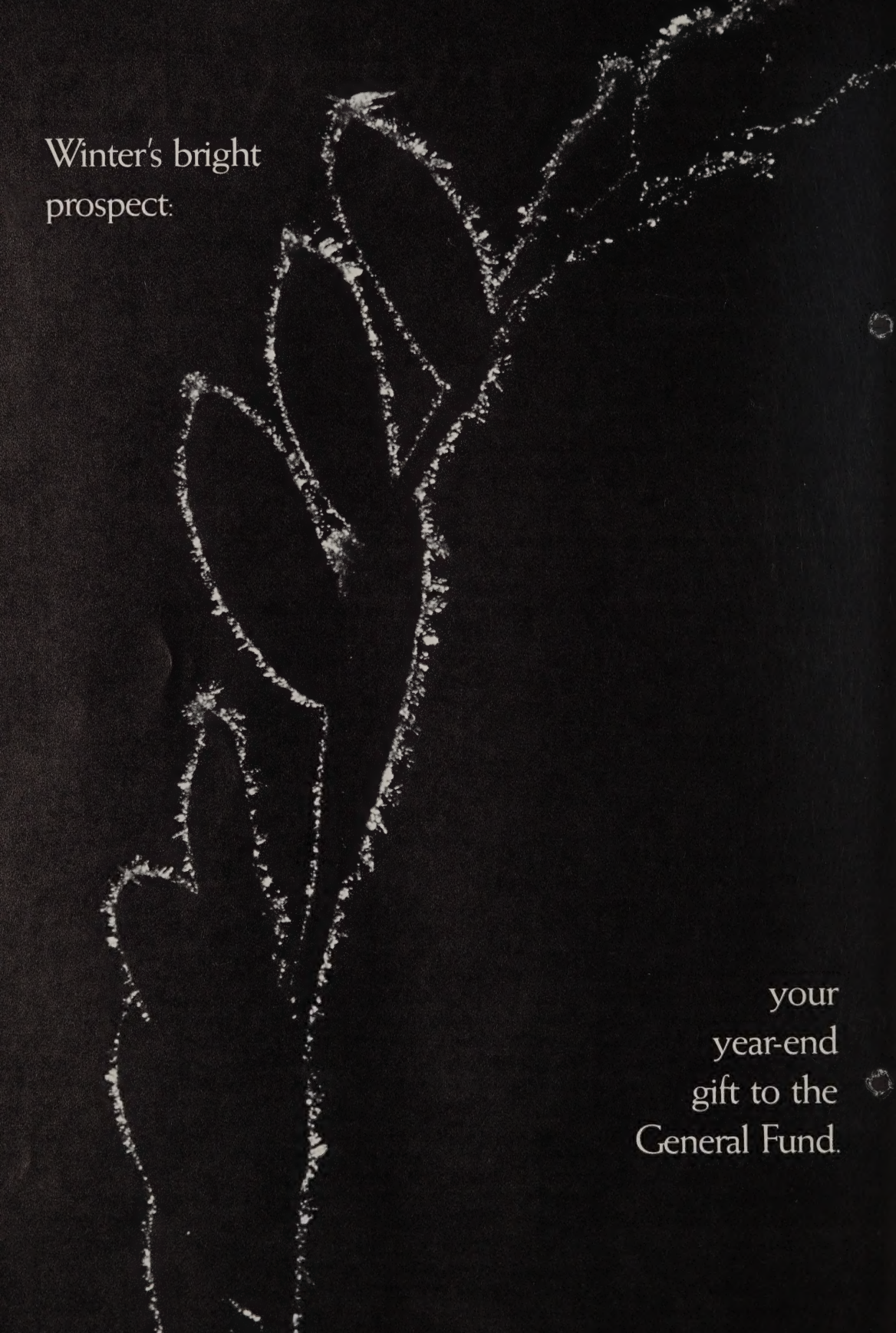
THE NATURE CONSERVANCY NEWS

November/December 1981



NATURE IN WINTER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THE NATURE CONSERVANCY NEWS

VOLUME 31, NUMBER 6
NOVEMBER/DECEMBER 1981

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THE NATURE CONSERVANCY NEWS is published bimonthly by The Nature Conservancy, 1800 North Kent Street, Arlington, Virginia 22209

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COVER: A match for winter's white—the snowy owl. Photo by R. Hamilton Smith (Earth Imagery).

The Nature Conservancy is a national conservation organization committed to the preservation of natural diversity by protecting lands containing the best examples of all components of our natural world.

To date the Conservancy and its members have been responsible for the preservation of 1,844,941 acres of forests, marshes, prairies, mountains, and islands: home to rare and endangered species of wildlife and plants. 2,783 projects have been completed since the acquisition of the first preserve in 1954. Approximately 60% of all preserves are retained by the Conservancy and managed by volunteer land stewards.

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ICE

An Essay by John Haines

American poet and essayist John Haines homesteaded in central Alaska for 17 years. "Ice"—prepared for this issue of the News*—draws upon his experiences there along the Tanana River. Mr. Haines's books include* Winter News *(Wesleyan, 1966),* The Stone Harp *(Wesleyan, 1971),* Twenty Poems *(Unicorn, 1971),* In Five Years Time *(SmokeRoot, 1977),* and In a Dusty Light *(Graywolf, 1977). A book of his essays,* Other Days, *is being published this year by the Graywolf Press in Port Townsend, Washington.*

For some time now in the woods, away from the sun, in ravines and hollows where the ground is normally wet, the soil has darkened and is hard and cold to the touch. The deep, shaded mosses have stiffened, and there are tiny crystals of ice in their hairy spaces.

Water has sunken in the pools of the footpaths; in the high ridge trails the small potholes are ringed with transparent ice, or they are filled with whitened splinters shattered by the foot of some passing animal. Ice thickened with leaves surrounds a circle of open water in the flowing pool of the creek below the house.

The waters are freezing. From the reedy shallows outward to the centers of the roadside ponds: black ice, clear and hard, with bubbles that are white; opaque patches of shell ice that shatter easily when stepped on. The last ducks that kept to the open centers of the ponds are gone. Clumps of stiff, dry grass stand upright there, held fast, casting their shadows on the evening ice.

Now that the steady frost has come, I have been thinking about the river. It is time to take a walk

over the sandbars and islands, while there is still so little snow. It is late October, and the smaller channels of this broad and braided river have long since stopped flowing, and their remaining pools are frozen. Far out in mid-river, beyond the big, wooded island, a single large channel is now the only open water. The sound of that water comes distant, but strong and pervasive, over the dry land dusted with snow: a deep and swallowed sound, as if the river had ice in its throat.

One afternoon I take the steep path downhill to the riverbed. I make my way across to the big island over sandbar and dusty ice, past bleached piles of driftwood and through waist-high willows and alders, to the gravelly, ice-coated shore of the open channel. I walk a short distance out on the shore ice and stand there, looking at the water. A little wind comes down the wide river, over the frozen bars, smelling of winter.

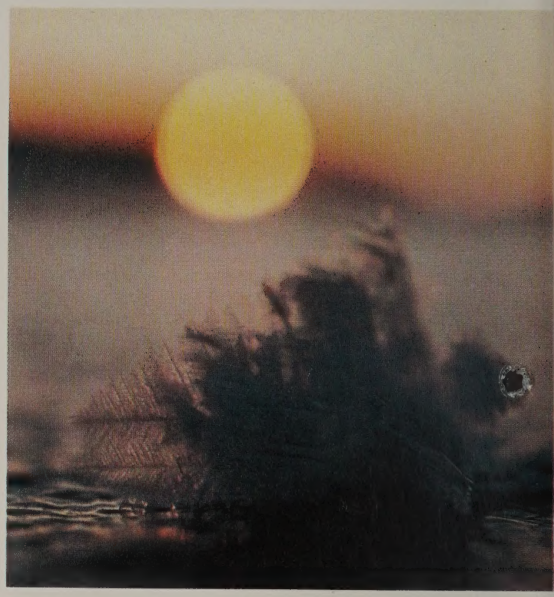
Free of its summer load of silt, the water is clear in the shallows, incredibly blue and deep in the middle of the channel. Ice is riding in the water, big rafts of it crowding each other, falling through the rapids above me and catching on the bottom stones. Here where the current slackens and deepens, the water is heavy and slow with ice, with more and more ice.

Call it mush ice, or pan ice. It forms at night and during the colder days in the slack water of eddies and shallows: a cold slush that gathers weight and form. Drifting and turning in the backwaters, it is pulled piecemeal into the main current and taken down.

Now on the heavy water great pans of ice are coming, breaking and reforming, drifting with the slowed current: shaggy donuts of ice, ragged squares and oblongs, turning and pushing against each other, islands of ice among lakes of dark blue water. Crowded shoreward by the current, they brush the shore ice with a steady "shsss" as they catch and go by. And with each sheering contact a little of that freezing slush clings to the outer edge of the shore ice. The ice is building outward, ridged and whitened, thickening with each night of frost, with each wave of shallow water that washes it.

As I look intently into the shallows, I see that boulder ice, a soft, shapeless and gluey mass, is forming on some large, rounded stones not far below the surface; the river is freezing from the bottom also. Now and then a piece of that water-soaked ice dislodges and comes to the surface, bobbing in the moving current, turning over and over. It is dirty ice, grey and heavy with sand, small stones, and debris.

Where it gathers speed in the rapids above, the

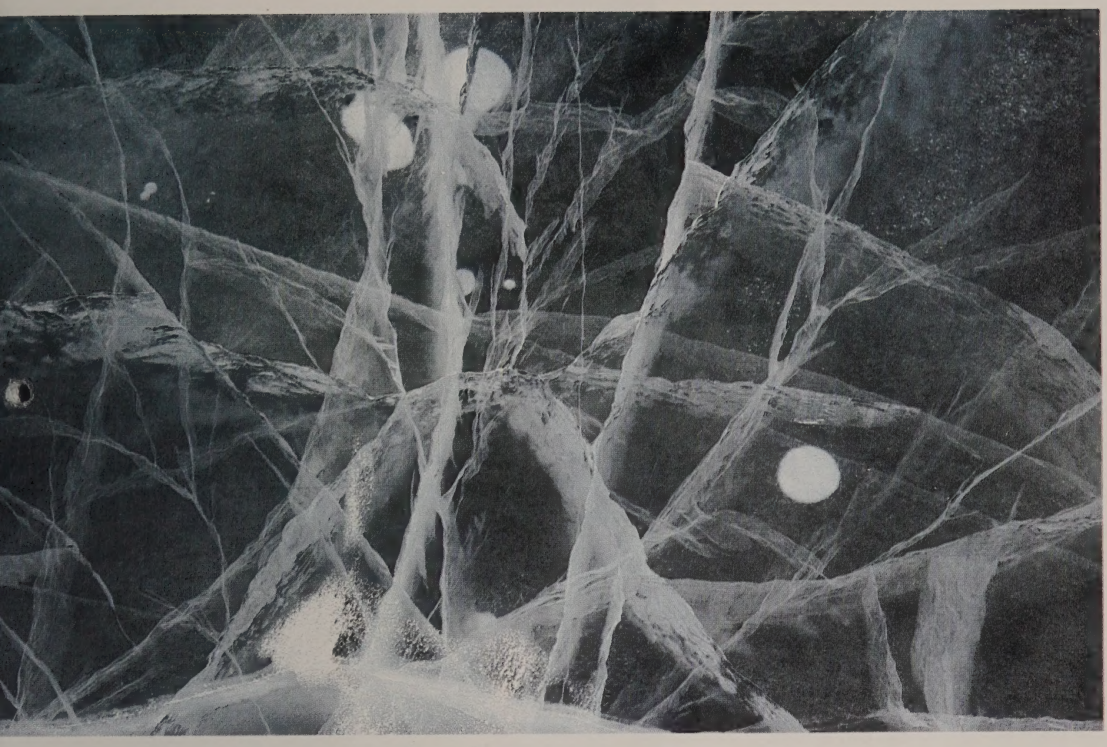


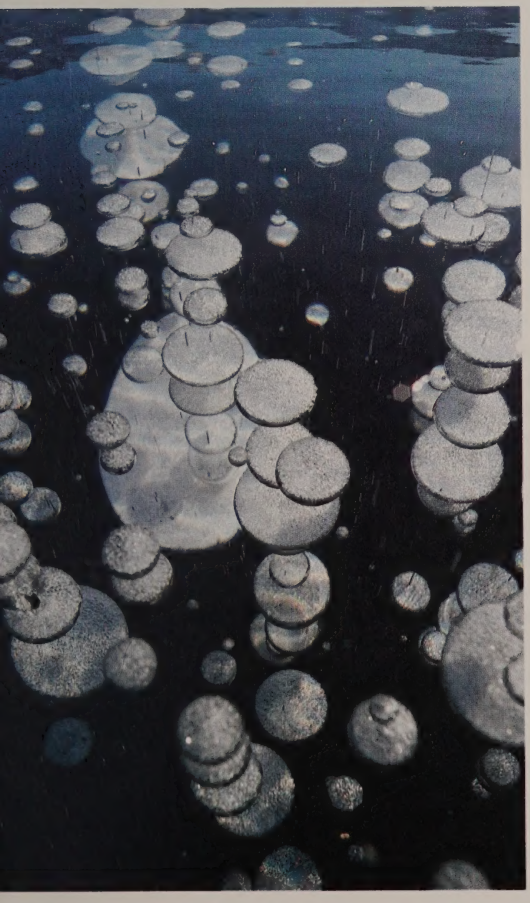
"Delicate flowers of frost will bloom upon it: small, glittering blossoms standing curled and fragile on the gritty ice, to be scattered by the first passage of air."

sound of all this ice and water is loud, rough, and vaguely menacing. As the cold gradually deepens and the sunlight departs in the days to come, the floating ice will become harder and thicker, and the sound of its movement in the water will change to a harsher grinding and crushing. Now in the slowed current before me, it is mostly that steady and seething "shsss" that I hear, and underneath it a softer clinking as of many small glasses breaking against each other.

Standing here, watching the ice come down, I recall past years on the river. Each fall when the salmon season was over and the nets were dried and mended and put away for the winter, it was time to move our big poling boat upriver to safe storage. And how with a steel-tipped pole and a pair of lines I worked that heavy wooden boat against the current. Standing braced at the stern, I slowly poled through the shallows, finding purchase for the pole in the shifting gravel of the river bottom. At intervals when the current was too swift or the water too deep, I walked and lined the boat along the shore against the oncoming water, breaking the thin shore ice underfoot with my rubber boots.

One year an early freeze caught us before we had time to move the boat. Overnight in the sud-





den cold there was ice in the channel. I spent the better part of a day attempting to maneuver the boat against a current that was heavy with slush. Ice clung to the pole and the oars, and the boat grew sluggish with the drift that was freezing against it. I was unable finally to make sufficient headway. At last we reached a point of land with a bank out of reach of the winter ice. We beached the boat, its bottom and sides now heavy with ice, and with much labor we drew it out of the water and onto the sandbar. We raised it on a pair of dry poles and left it there for the winter. That was the earliest freeze-up I can remember; it was well below zero by the second week of October.

I think of the early days in this country when the rivers were the primary means of summer travel. And of the people—natives and whites—working their heavy wooden boats upriver to the trapping ground: poling, wading the ice-choked water with a growing urgency, as the days shortened, to reach their winter stations before freeze-up. And of the big shallow-draft steamboats finally stopped by the shoaling water. Their wood fires dampened, they were warped into shore below Fairbanks and secured for the winter against the crush of the ice.

Like rainfall in a land of dryness, life on a northern river is ruled by the ice, its presence and its absence. And to struggle day by day upriver into the current and the ice is to feel oneself part

"Caught there in the clear, black depth of the ice, I see a few small sticks, and many leaves. . . . But nothing moves there. It is a still, cold world, something like night, with its own fixed planets and stars."

of something so old that its origin is lost in the sundown of many winters. A feeling intensified, made rich by the smell of ice and cold fish slime; by the steely color of the winter sky, the whiteness of early snow on the sandbars; by the occasional crimson flash of a salmon in the ice-blue water, and by the strong blackness of a solitary raven flying with a remote, hollow call from one wooded island to another.

I see no salmon now as I stand here by this ice-filled channel, searching its green, bouldery shallows and bluer depths for a tell-tale flash of crimson. It may be that there is not a good run this fall, that I am too early or too late, or that the fish have taken another way upriver. The sound of the water and the ice before me is one sound, familiar over the years. But there are other sounds of the ice, among them the strange and eerie moaning that comes from under the new ice of a pond when it is walked on, as if some sad spirit in the depth of the pond were trying to speak. In midwinter, a large sheet of ice will split with a rippling crack when the temperature suddenly changes or the ice bed shifts underneath, the ripple traveling fast with a winnowing sound at the end. And there are those small, ticking sounds of the ice in the evening when the cold slides toward its deepest zero, as if a thousand hidden insects were chirping bitterly in chorus under the ice and snow. And, finally, the thundering crack and plunge of the shelf ice breaking off in the spring as the rising water wears away its support, a sound that can be heard for miles, like the detonation of a heavy building.

The ice sings, groans, howls, and whistles like a living thing. Years ago when I was stopped by the side of a gravel road in the Alaska Range I heard the oldest lament of the ice. It was early in October, and as I stood there alone and listening—with the slow freeze coming down over the empty land and its many lakes—I heard on the nearly windless air, as if from the earth itself, a muted and forsaken moaning from the lakes and ponds. It was a sound out of prehistory, of something deeply wounded and abandoned, slowly giving up its life to the cold. There were fleeting ghost-fires on the tundra, white-maned shadows from the bands of

caribou fleeing before something I could not see. Then, distant shots, gunfire, the sound of a truck rattling by on the frozen road.

Here before me the river is still awake, still speaking in its half-choked mutter and murmur, still surging, pushing its ice-filled way across the open stand and gravel. But one day—it may be soon, or it may be very late, when the solstice sun clears the south horizon—the sound of all this surging and grinding, this shredding and crushing, will stop. The great silence will have come, that other sound of the ice, which is almost nothing at all. This channel will have finally filled, the last open water will close, and the river will go under the ice. Snow will drift and cover the ice I stand on.

If I were to walk out here in midwinter, the only sound I would be likely to hear would be the wind, pushing snow across the ice. Only now and then, while walking over the frozen shallows, would I hear under my feet the sound of trickling water finding its way somehow through the ice. And later still, when ice has thickened to a depth of many feet on the deepest channel, I might hear far down in some snow-filled crevice the deep murmur and surge of the river running beneath me.

For the ice and the river under it are never still for long. Again and again throughout this long winter, water will find its way into the open, welling up from a seam in the ice, and spreading over the existing surface of ice and snow to freeze again in a perilous sheet. The wind will bring its dry snow to polish the new ice and turn it into a great slick and glare. Delicate flowers of frost will bloom upon it: small, glittering blossoms standing curled and fragile on the gritty ice, to be scattered by the first passage of air. And over the renewed expanse of ice there will be silence again, the silence of ice, unchanged since the first winter of Earth.

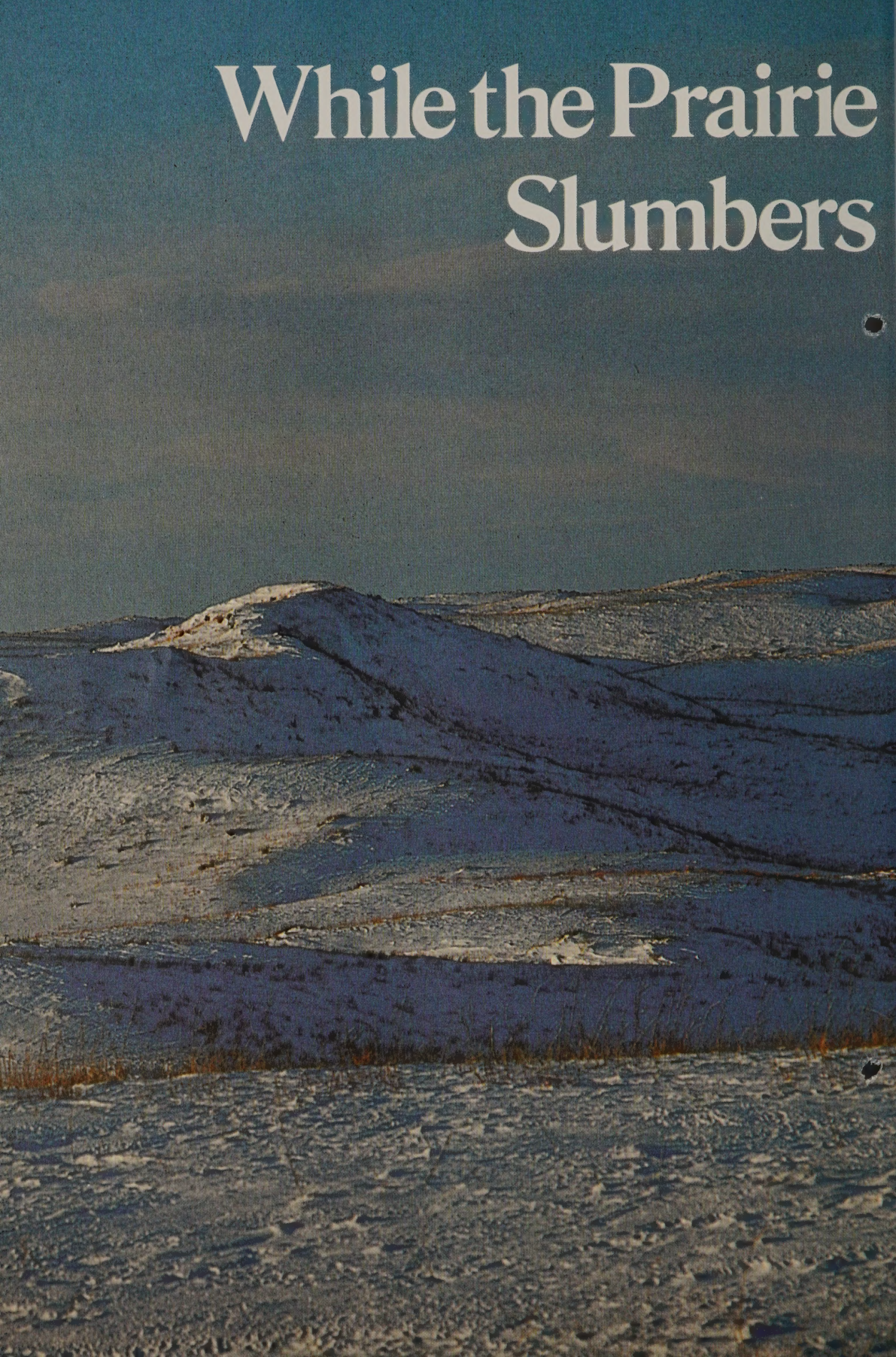
But all this is still to come, as it has come before. Winter is making its way across the land, over slope and plain, bog and high meadow, across lake and pond, outlet and feeder. It has progressed slowly this fall in an even, majestic tread, with a little more frost each night, a little less warmth each day. Meanwhile, the open water of the river flows at my feet, steady and heavy with ice, the deep sound of it filling the landscape around me.

I turn and walk back to the home shore whose tall yellow bluffs still bare of snow I can see nearly half a mile to the north. I find my way as I came, over dusty sandbars and by old channels, through shrubby stands of willows. The cold, late afternoon sun breaks through its cloud cover and streaks the grey sand mixed with snow.

As it has fallen steadily in the past weeks, the river has left behind many shallow pools, and these are now roofed with ice. When I am close to the main shore I come upon one of them, not far from the wooded bank. The light snow that fell a few days ago has blown away; the ice is polished and is thick enough to stand on. I can see to the bottom without difficulty, as through heavy, dark glass.

I bend over, looking at the debris caught there in the clear, black depth of the ice: I see a few small sticks, and many leaves. There are alder leaves, roughly-toothed and still half green, the more delicate birch leaves and aspen leaves, the big, smooth poplar leaves, and narrow leaves from the willows. They are massed or scattered, as they fell quietly or as the wind blew them into the freezing water. Some of them are still fresh in color, glowing yellow and orange; others are mottled with grey and brown. A few older leaves lie sunken and black on the silty bottom. Here and there a pebble of quartz is gleaming. But nothing moves there. It is a still, cold world, something like night, with its own fixed planets and stars.

While the Prairie Slumbers



Article and photographs by Jon Farrar

The prevailing winds have shifted to the north and northwest, winds that gather cold across the tundra and send icy fingers probing out across the Great Plains. The screams of curlew have drifted south with the autumn. Bands of sandhill cranes have milled overhead and also moved on, followed by carefully drawn lines of geese. Meadowlarks no longer attend their singing posts and the fragile nests of grasshopper sparrows are fraying in the relentless wind. Winter has arrived.

In the grip of winter the prairie is a moonscape. But life is here, subdued, enduring in its own way the abandonment of the sun, or lying dormant, waiting for warmth to return to the soil.

This is the largest unbroken stretch of grassland in the United States: the Sand Hills region of north-central Nebraska, which occupies one quarter of the state—nearly 20,000 square miles. It is the largest dune area in the Western Hemisphere and is cloaked, unexpectedly, by a lush mixed-grass prairie. Stored under this vast blanket of grass—in thick beds of sand, gravel, and sandstone—is a natural reservoir of 700 to 800 million acre-feet of water, ten times as much as is held in all of the Missouri River's mainstem reservoirs. The water table is high and surfaces in the region's deepest valleys as freshwater lakes.

The Sand Hills area is a land of contradictions, an expanse of rich grasses and abundant water where most people would expect to find cactus patches growing on rippled sand. It is one of the few remaining sites in the country where a grassland may be found much as it was when the first Americans spilled through the sanctuary of the eastern mountain ranges two centuries ago.

Geologically, it is new country, still rough around the edges. It was only 10,000 years ago, when the last of the great glaciers ground down from the north, that the vegetation lost its grip on the land and the wind washed great waves of sand into the east-west ridges, some 10 miles long and 100 to 300 feet high. As the climate moderated, the glaciers melted, releasing tremendous quantities of moisture into the atmosphere. The period of cold drought was broken and a new vegetation migrated from the south to bind the rambling dunes in place.

On the Sand Hills' southern edge, some 30 miles north of the old cattle trail-head town of Ogallala, is Arapaho Prairie, a two-square-mile area that The Nature Conservancy purchased in December, 1976. It is managed as an ecological research site by the School of Life Sciences at the University of Nebraska. Once part of the Nebraska National Forest System—a grand dream of University of Nebraska botanist Dr. Charles Bessey to forest large portions of the Sand Hills with cedar and pine—it was opened to settlement as surplus land in 1913. Claimed by Kinkaiders during this nation's last great land giveaway, Arapaho Prairie was patented and the fragile soil broken in a broad valley. (Kinkaiders were settlers permitted on free land in Nebraska under terms of the 1904 Kinkaid Act, which allowed each bona fide settler 640 acres upon paying a filing fee of $14.) In a handful of years these "one-section ranchers" had learned the same lesson as the Homesteaders of the 1860's: "God placed this soil upright. Don't turn it over." By the mid-1920's the two sections of grassland destined to become Arapaho Prairie were sold to a rancher, and white-faced cattle replaced the plow.

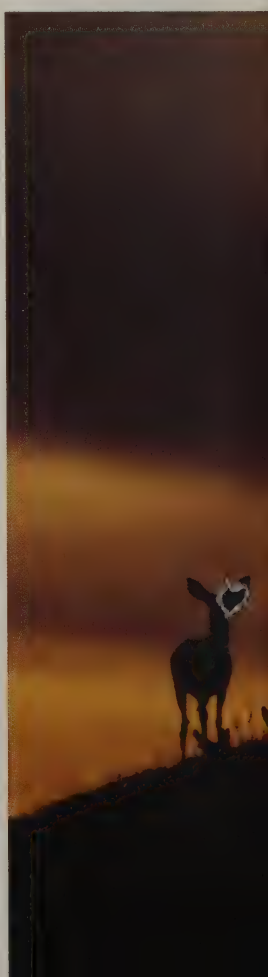
Winter is an imprudent time for a first meeting with Arapaho Prairie but a good time to visit an old grassland friend. You must know the features of the prairie in the snow-free months to recognize it in winter. Its terrain is rugged, typical of the Sand Hills—long, steep dunes that grade into smaller undulating hills and finally give way to broad, flat-bottomed valleys. The wind has carved blowouts where the fragile grassland was gashed with the plow, and erosion has festered the cuts of old cattle trails on the slopes. But during the years that Arapaho has not been pastured, native grasses have begun to close the gaps of exposed sand. Stiff-backed clumps of little bluestem stand above the snow on the ridge lines and frozen, rigid leaves of yuccas radiate like the bayonets of stacked muskets. The shellacked red fruit of the wild rose, the prairie's "holly," is an unattended dash of color on the ghostly dunes. Fence lines and the undulating ridges, blown clear of snow, provide the only reference points. On neighboring ranches the cattle trails wind through swales in the hills where elk and bison once passed. Catsteps (grazing trails that wrap around the steep hills, one above another) have disrupted the grassland, slowing succession, yet increasing the diversity of plants and animals, as "weedy" newcomers establish themselves and begin to bind blowing sands in place.

There is little conspicuous activity on the winter prairie; but in the master design that guides this complex natural community, preparations are taking place, preparations that will later support the swelling growth of spring and summer. During the growing season, when Arapaho Prairie receives three fourths of its precipitation, most of the rainfall is lost directly through evaporation or plant transpiration during photosynthesis. Little is left

over to recharge the groundwater. Moisture that falls as snow in late winter and early spring percolates deep into the soil, replenishing the groundwater, feeding shallow wetlands, charging the interior rivers, and nourishing the Platte River, which borders the Sand Hills on the south, and the Niobrara River, which defines much of the region's northern boundary.

Heavy winter snows press drying grasses and forbs to the earth, forming a protective blanket over the living plant parts hidden beneath. In time this mat of vegetation will decompose and return to the soil the nutrients the plants had borrowed.

While Arapaho Prairie slumbers, some plants colonize new ground, sowing seeds that will germinate with spring rains. Carmine-colored winged pigweeds—the grassland's native tumbleweeds—are pulled from the sand and bounce across the prairie, spreading their progeny, reclaiming disturbed sites and the margins of blow-outs. The entire panicle (flower head and stem) of sand lovegrass breaks off and rolls in the wind, ensuring a seed source for every vacant patch of sand that will receive it. During winters with little snow cover,



Top: snow scamps the Western Hemisphere's largest dune expanse—the Sand Hills of north-central Nebraska; above: switchgrass in ice beads; opposite: a shadow play of mule deer.

the surface of the soil is dry and does not freeze; sand is in constant motion, covering seeds, embracing them in an environment receptive to germination. The tips of new rhizomes (underground, horizontal stems) of sand bluestem, switchgrass, and prairie sandreed—which had elongated to three to six inches in September and October—lie buried just under the ground's surface, waiting to send up new leaves when spring rains sweep across the brown hills.

Like the plants, some prairie animals lie dormant in the sand. Grasshoppers overwinter as eggs or nymphs only an inch or two underground, able to endure temperatures that may plummet to 40 degrees below zero. In the spring the first hatch will emerge, the parents-to-be of summer's multitude, and like cattle seeking favored plants, move to succulent patches of western wheatgrass to harvest their share of the season's abundance.

Arapaho's reptiles are underground too, waiting in death-like slumber for winter's passing. Bullsnakes, blue racers, and western hog-nosed snakes that lingered at the entrances of abandoned mammal burrows during the last warm days of autumn are now coiled in passages below the frost line, their body temperatures just enough above freezing to sustain life. Fence lizards and earless lizards that skated over the summer's searing sands have retreated to the soil's sanctuary as well. And a multitude of placid box turtles—as intrinsic to Sand Hills prairie as yucca and sand bluestem—are tucked tightly away in their high-arched carapaces of black etched with broad lines of yellow.

A grassland's zone of life, the plant layer, is only a few feet deep, so the living space is more condensed than in other biotic communities. It is little surprise then that grassland fauna all over the world are characterized by a preponderance of burrowing animals, which evolved to exploit the less crowded underground environment. During the winter some prairie animals modify their habits to avoid the harsh weather, others drift off into winter sleep in darkened passages, and a few doze through the worst of the season but awake to hunt for food on moderate days.

Ground squirrels hibernate deep underground, feasting on the summer abundance that added tremendous stores of fat to their bodies. Heartbeat,

A coyote patrols the winter prairie, a land alive with hunting opportunities.

respiration, and body temperature are reduced to the lowest levels so as to ration out fat reserves. Prairie voles expand their labyrinthine tunnels through the vegetation at ground level and go about their chores of feeding, insulated from the cold and wind by a blanket of snow, hidden from the view of winged predators above. A persistent snow cover may lure as confirmed a subterranean dweller as the pocket gopher up from the depths to burrow through the snow and forage above ground.

Tiny tracks made by an animal dragging an oversized tail across the new fallen snow confirm that not all burrowing mammals have acceded to winter's claim over the prairie. Only the harshest weather keeps the Ord kangaroo rat below ground in its webwork of tunnels. Grass-lined nest chambers and caches of seeds diligently stored during more plentiful times can sustain it underground for weeks at a time. But when the cold and snow relent, however briefly, the fawn-colored mouse emerges at night to search for new seeds spread on the snow by winter winds.

Other prairie animals do not retreat underground; they are prepared by thousands of years of natural selection to challenge winter on its own terms. Legs that are feathered over the foot and a row of tough feather-like projections on each toe enable the sharp-tailed grouse to walk over soft snow as if on snowshoes. When the snow piles deep on the grasslands, sharptails burrow into it to roost, insulating themselves from cold and wind. Only prolonged snow cover, which buries their preferred foods, forces sharptails to retreat to shel-

Two of Arapaho's most adaptable natives: the white-tailed jackrabbit (whose dense underfur and fine guard hairs ward off the chill) and the plump, snow-stepping sharp-tailed grouse, pictured at a feast of tree buds.

tered river bottoms and windbreaks where they feed on tree buds.

Mule deer are equally well designed to endure the trials of winter on the open grasslands, waiting out the fiercest storms in thickets and deep ravines. Like the sharptails they are stressed only by weeks of deep snow cover that prevent them from feeding. Native white-tailed jackrabbits, and the smaller black-tailed jackrabbits that followed settlers' cultivation into predominantly grassland areas, retreat to snow caves for protection from the elements, insulated by a dense underfur and a halo of fine guard hairs.

Most predators on the prairie can neither retreat to underground burrows in the face of winter nor cache a supply of winter food. Forced by constant hunger, they patrol the snowy dunes in search of prey. The long-tailed weasel has molted to ermine white to blend with the season and pursues prairie mice and pocket gophers through their sinuous tunnels. The badger that grew squatty and fat during late summer can afford the luxury of sleeping through much of winter but seldom misses a period of mild weather to emerge from its burrow and compete with the weasel for food.

Of all the predators none is more opportunistic than the coyote, an adaptive hunter that flourishes on the failures of others to endure the hardships of the long prairie winter. Blizzards that starve deer or pile range cattle into fences to die provide a winter of comfort for these scavengers. Cornered in their snow caves, jackrabbits and grouse are more vulnerable, and as winter wears on mice are forced to take greater risks to supplement their dwindling food supply. Spring seldom finds a ribby coyote on the prairie.

On the Arapaho Prairie winter seems an especially savage season. Snow is nearly always driven by winds, and there is precious little to slow the gales. One complaining plainsman noted that the only thing to brake the wind between Canada and Texas is a barbed-wire fence, and it's usually down. Four inches of snow set in motion by 40-mile-an-hour winds pile drifts that obliterate everything on the horizon except windmill towers. Under such conditions, it is a tribute to nature's shaping hand that any life—plant or animal—can survive. So the winter grassland lies dormant but alive, awaiting the warmth of a new spring's sun.

Jon Farrar is Senior Editor of *Nebraskaland,* published by the Nebraska Game and Parks Commission. A free-lance photographer and writer, Mr. Farrar's articles and photos have appeared in *Natural History, Audubon, National Wildlife,* and in National Geographic books. America's grasslands are his specialty.

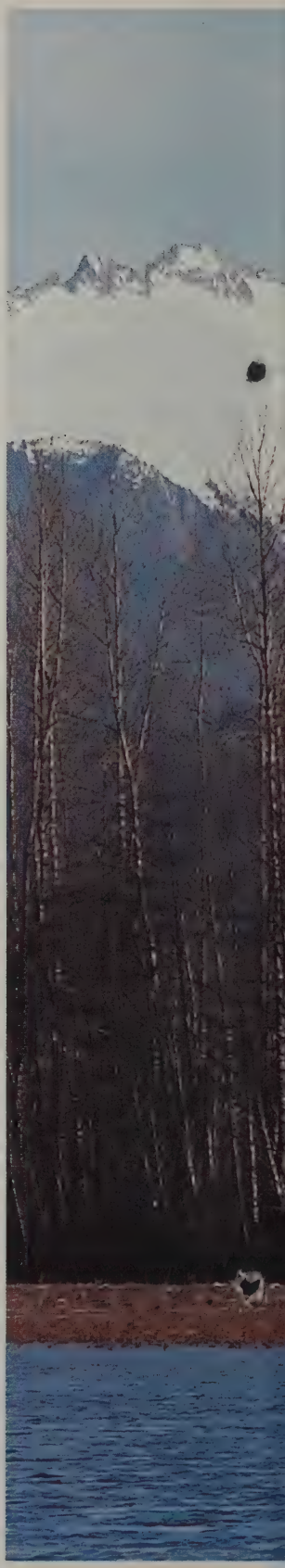
Winter Gathering on the Skagit

by Fayette Krause

Sixty miles north of Seattle, Washington, the Skagit River broadens into a wide alluvial fan before emptying into Puget Sound. Even amidst this sprawling plain, small, tree-covered hills rise abruptly, harbingers of the Cascades to the east. Following the river upstream, the valley floor narrows, as steep-sided foothills encircle the diminishing lowlands. Behind the foothills the majestic North Cascades cap the altitudinal progression with many peaks exceeding 8,000 feet. It is an awesome sight and through it all the common element is the river, knitting the disparate landscapes into a cohesive whole.

The Skagit River Valley is a land of brilliant summer hues and rich autumnal colors. By mid-November, however, the last traces of red and yellow disappear and winter casts a five-month pall over the vale. The moderating influence of the Pacific's Japanese Current limits snowfall. Instead, clouds and drizzle define the season, producing the American counterpart to the "soft" weather of the British Isles.

This Britannic weather is a dubious boon for people accustomed to winter sun. While Skagit delta residents get a tolerable 30 inches of rain annually, the mountain barrier increases precipitation eastward. Fifty miles upstream at Marblemount, average rainfall climbs to 80 inches, and at Diablo Dam, a scant 20 miles farther, annual precipitation can exceed 100



inches. The overcast sky and the relentless rain weigh heavily, evoking an impressionist's canvas done in tones of gray.

To an outsider, living in the area seems to require a special temperament. But the scenery is not all bleakness. Just as November brings rain, it also heralds the return of the first wintering bald eagles to the Skagit—one of the five most important gathering points south of Canada for this threatened species. Initially an individual or a pair appears. By mid-December, ranks swell to 100 or more eagles. Finally, in January the birds peak with numbers ranging from 200 to 400 depending upon food availability.

It is not happenstance that the eagles congregate on the Skagit, for the river hosts the largest naturally spawning salmon runs in the Puget Sound region. The advent of the eagles closely coincides with the appearance of chum salmon, one of two salmon species that spawn in the river during winter months. The chum, like other salmon, begin their life in fresh water. Several months after the fry emerge, they migrate downstream to salt water, where they spend virtually their entire adult lives (usually four years for chum). In the final few weeks of their existence, they return to the streams where they were reared, deposit their eggs, and die, perpetuating a cycle thousands of years old.

A number of the fish carcasses become stranded on gravel bars following the massive die-off, creating a veritable banquet table for the eagles. These buffets can be an olfactory affront to humans, but the birds don't seem to mind. Where food is plentiful, 20 or more eagles may mass along the shoreline, sharing their windfall with the crows and gulls.

The eagles' attraction to carrion is an excellent winter foraging strategy because, though the birds are quite capable of capturing live prey, the fish carcasses provide a reasonably high caloric pay-off for little energy expenditure. As long as the food source remains, the birds congregate, taking advantage of the opportunity to build fat supplies necessary for their forthcoming season of courtship and breeding. The situation appears idyllic except for one factor: before 1975 most of the eagles' critical feeding and perching habitat was privately owned and completely unprotected. That is where The Nature Conservancy came in.

The Conservancy's involvement in the Skagit River project provides a textbook example of the various techniques used in its land protection program. First it was necessary to identify adequate boundaries for a viable preserve. Fortunately a two-year study had just been completed, pinpointing the prime eagle habitat on the Skagit—a seven-mile river-front stretch between Rockport and Marblemount. The Washington State Department of Game already owned approximately 500 acres of the 1,400 deemed most important. In addition, the department, which had partially funded the study, was interested in expanding its holdings. With this commitment the Conservancy began negotiations with the private landowners.

Two of the three owners were forest products companies: Scott Paper and Simpson Timber. Both worked with the Conservancy to establish the preserve and both offered substantial gifts or bargain sales (sales at below fair market value) in the land they transferred. Fred Martin, a Skagit Valley native, was the third owner. As active and avid a supporter of the eagles today as he was five years ago, Martin, with the exception of several stints as a state legislator and federal employee, has lived his entire life in the valley. When approached by the Conservancy, he offered his land at a considerably reduced price, thereby adding the final piece needed to create the entire 1,400-acre preserve.

Once the Conservancy had negotiated agreements, the Game Department procured sufficient funding to repurchase 600 of the 900 acres under option. This exhausted the agency's budget for the project, however, and left the fate of the remaining 300 acres in doubt. At that point the Conservancy decided to initiate a fund-raising campaign to complete the preserve. In a short time various foundations, conservation organizations, and individuals —including then-Washington Governor Dan

What brings eagles to the Skagit? The winter run of salmon, anadromous fish (they live at sea but spawn in fresh water) that constitute the wintering birds' primary food source.

Evans—were offering support and assistance. The money was raised in only one year, and the refuge became a reality.

From its inception the Skagit River Bald Eagle Sanctuary has been the Conservancy's star attraction in Washington. During December and January visitors to the preserve may exceed 400 per weekend. To accommodate them without disturbing the eagles, the Department of Game and the Conservancy, which co-manage the sanctuary, direct visitors to two roadside vistas adjacent to State Highway 20. People arriving early in the morning may see the eagles scavenging the sandbars below. The birds usually feed from shortly after dawn to around 11:00 a.m., when they retire to perch trees along the river. The eagles fly to night roosts at or near dusk, though their flight is sometimes preceded by a late afternoon meal. When ample food is available and far-ranging foraging unnecessary, the raptor's life style can be a languid one.

On rare sunny days, heated air rises from the valley floor, prompting some eagles to break from routine and indulge in an impressive winter display. Individuals and small groups of eagles, wings widespread, take advantage of the convective currents and soar upward on the ascending thermals. Occasionally 20 or more form an inverted vortex, the bottom of which is composed of half a dozen circling birds. Stacked above them, a second and third tier of eagles appear to be diminutive copies of the species. At the apex of the cone, those first to catch the rising air are mere dots, soon to be lost from view as they continue their effortless ride.

The Skagit River has proved attractive not only for spawning salmon, wintering eagles, and people eager to see both, but also for those seeking other "treasures." The ink had scarcely dried on the deeds when the preserve faced its first serious threat.

In its search for new, non-polluting energy sources, Seattle City Light, the city's municipally owned utility, turned to the Skagit River where it already had several hydro-electric projects upstream from the refuge. Previous dams, built decades before, were constructed above salmon spawning grounds and so had little adverse impact on bald eagles. But the proposed dam, to be constructed at the confluence of the Skagit and Copper Creek, differed from the other projects because it would eliminate 11 percent of the Skagit's chum salmon and even greater percentages of other salmon species that also spawned upstream.

The trustees of The Nature Conservancy's Washington Chapter expressed concern about the proposal for two reasons. First, it was unclear if salmon carcasses from upstream spawners constituted a significant potential food source for eagles feeding downstream. If they did, the Copper Creek dam could affect the eagles' food supply. Second, little information existed as to how many eagles the proposed dam area accommodated during the winter and where the birds would go if displaced. City Light and the Seattle City Council responded positively to these concerns and provided approximately $400,000 for a two-year eagle impact study —probably the best funded short-term bald eagle research project ever undertaken.

The study became a model for citizen involvement in the public decision-making process. During the project the Conservancy worked closely with Seattle City Light, providing important data on eagles from previous years, reporting weekly census figures for eagles using the Skagit River preserve, and participating in numerous meetings at the utility's request. In conjunction with the Department of Game, the Conservancy and City Light co-sponsored a Washington State Bald Eagle Symposium in 1980, where all aspects of eagle research in the state were discussed.

Ultimately, both of the Conservancy's concerns proved well-founded. A significant number of fish did drift downstream from the Copper Creek area, yielding potential food for the eagles. During the first year of the study, researchers also documented the importance of the proposed dam area for the eagles in years with low chum runs and relatively high coho salmon spawning. Prior to the study cohos—the only other winter spawning salmon on the Skagit—were thought to play little if any part in sustaining the eagles. Surprisingly, it was observed that in the winter of 1979-80, Copper Creek was the area most heavily used by the Skagit eagles for several weeks during February because of relatively large numbers of late-spawning coho.

In addition, by radio-tagging a score of eagles, researchers learned how highly mobile the birds really are, both within and outside the Skagit watershed. Eagles that foraged on the preserve one day could be found feeding at or above Copper Creek the next. The river's entire drainage was more clearly seen as a unit and the eradication of any proven significant habitat as potentially injurious to the raptors.

At the end of the study's second year, the researchers stated that during the 1980-81 winter the Skagit was supporting the maximum possible eagle population. Consequently, eagles displaced under such conditions would not be able to find suitable habitat elsewhere on the river. Researchers further speculated that adult birds "would not die as a result of being forced from the Skagit, but in

Action on the Skagit: a young eagle swoops up a salmon as an elder looks on.

some years they may be unable to amass sufficient resources for breeding." Weighing all factors—which included the impact on American Indian commercial fishing of the Skagit and seismological considerations, as well as the dam's potential effect on the eagles—the Seattle City Council, in spring 1981, voted overwhelmingly to shelve the project.

The decision on the Copper Creek dam was fortunate for the eagles. Piecemeal destruction of habitat and the devastating effects of persistent chemicals on eagle reproduction are the two main reasons for the species' decline elsewhere in the United States. At a meeting called to brief people and organizations interested in Seattle City Light's eagle studies, one official reflected on the precipitous decline of the southern bald eagle and its slow recovery. Given the increasing concern for our national symbol over the last 25 years, he conjectured, "If the people in the Southeast had it to do over again, they would make different choices." Across the continent in the Pacific Northwest, the verdict for the raptor remains uncertain. Washington has the largest wintering bald eagle population in the lower 48 states, but any number of habitat alterations could seriously affect the birds' status.

In March the incongruously high, tinkling call of the bald eagle will be stilled in the Skagit River Valley. This seasonal absence is natural, and those acquainted with the eagles' ways know that as long as fish run in the river, the birds will return to brighten the somber winter days. The Nature Conservancy will be there, too, to protect the raptor that, above all others, has symbolized wildness and freedom for North Americans. It is a legacy eminently worthy of defense.

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ECOLOGY FORUM

No. 42

by Brian McNab
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THE SLEEPING ONE

To an outsider driving between Indio and Blythe in Riverside County, California, the mountains look barren and lifeless. But the initiated know that this delicate, vulnerable desert supports an array of animals and plants that have adjusted over time to a severe environment. The desert's harshness is characterized by high summer temperatures and very low winter temperatures, intense solar radiation, and an undependable water supply. Here one finds kangaroo rats whose urine may be 14 times as concentrated as their plasma and pocket mice that, with a shortage of food or water, enter torpor (a physiological state typified by reduced metabolic rates and lowered body temperatures).

In December 1946, within one of the narrow desert canyons dissecting the Chuckawalla Mountains, Edmund C. Jaeger discovered a torpid poorwill, a western relative of the nighthawk, whip-poor-will, and chuck-will's-widow. The bird was sitting in a small depression along a canyon wall. Although inactive and cold to the touch, it would slowly open an eye when disturbed. A poorwill was seen in the same place that January. The next year Dr. Jaeger found a torpid poorwill, presumably the same one, in the very same depression. That bird was banded, its body weight measured, and its body temperature recorded at various times through late February. The poorwill was thought to be inactive throughout the period that it was observed. It returned to its niche in the canyon wall the third year. Dr. Jaeger had discovered what appeared to be the first case of hibernation by a bird. In fact the Hopi Indians had observed this phenomenon long before Dr. Jaeger. They called the bird Hölchko, "the sleeping one."

Although torpor is known to occur in other avifauna—such as swifts, hummingbirds, collies, and chickadees—the poorwill is the only bird species that has been observed and documented to hibernate. The difference between torpor and hibernation is largely one of duration, the former usually being shorter, while the latter is defined as an extended period of torpor. Hibernation is also characterized by the pre-winter accumulation of large amounts of body fat.

Hibernation is an extreme solution to the problems faced by warm-blooded vertebrates in a temperate climate. Winter is a difficult season for many mammals and birds because less food is available to meet the high energy requirements of regulating their body temperatures. If a mammal or bird feeds on a food not generally available in winter—like insects or fruits—the animal has only two options: it must migrate to an environment where food is continuously available, or it must abandon temperature regulation and enter hibernation. Among warm-blooded vertebrates, migration is commonly used by birds, because of their remarkable capacity for long-distance movement, and hibernation is used almost exclusively by mammals.

On a planet as diverse as ours, there may well be other species of birds that hibernate. Why this behavior is so rare among avifauna and why it occurs in the poorwill are questions that remain unanswered. At least two factors contribute to the natural selection of hibernation behavior by poorwills: first, they feed on flying insects, and second, they are among the smallest members of the goatsucker family. Winged insects, of course, are unavailable as long as air temperatures are near or below freezing; nocturnal species are especially affected. Furthermore, the smaller the mammal or bird, the shorter the time that it can survive without food. (In fact, most birds known to enter torpor are small species, the extreme case being hummingbirds, all of which, whether tropical or temperate, are capable of entering torpor.) The poor-

will's "solution" to its problem of size and restricted diet is adaptive behavior that periodically eliminates or reduces the time it must spend feeding. Given the similarity in size and diet (flying insects) of swallows and swifts, one would expect them to enter both torpor and hibernation as poorwills do. Yet swallows migrate; and, though torpid swifts have been observed, the species is not known to hibernate.

Inadequate shelter may be one factor that prevents more birds from hibernating. Mammals that hibernate do so either in burrows they excavate or in caves. But cavities available to birds may be too cold in winter. And most birds cannot take shelter deep in caves because few species are capable of echolocation. Poorwills find shelter on the surfaces of canyon walls, which means that they cannot hibernate in exceedingly cold environments. Consequently, the poorwills of the Great Basin desert of Oregon, Washington, and Idaho migrate to Arizona, California, and Mexico to avoid prolonged cold; and by roosting in canyons, the hibernating birds are not exposed to the desert's lowest winter temperatures. Nevertheless, the poorwills must be vulnerable to predators and other dangers since the canyons' shallow ledges and niches cannot provide total protection.

Few hibernating poorwills have been observed. Dr. Jaeger did determine, however, that the birds build up large quantities of fat prior to entering torpor and that they gradually use this fat during hibernation. We do not know whether the birds awaken and feed during a warm period in winter, although reports of occasional activity suggest that they do.

The canyon where Edmund Jaeger found his torpid poorwill lies within a 160-acre Nature Conservancy preserve, 80 acres of which the Conservancy owns while the second 80 are leased from the Bureau of Land Management. Lying at the base of the Chuckawalla Mountains, the area is scenic yet fragile. It is sparsely covered with smoke tree, ironwood, ocotillo, creosote bush, and paloverde. In March 1964 the preserve was appropriately named the Edmund C. Jaeger Nature Sanctuary to commemorate Dr. Jaeger's discovery of "the sleeping one."

Yet even now—35 years after Dr. Jaeger's discovery—the mystery of hibernating poorwills is still alive. Many questions remain, the most intriguing one being why this bird species hibernates and others do not. But perhaps other "sleeping ones" have not yet been observed. Only further research will reveal the answers.

From time to time, The Nature Conservancy exchanges membership lists with other conservation organizations whose work might also interest you. In this way, we are able to increase the Conservancy's membership at a lower cost than would otherwise be possible. However, if you prefer *not* to receive these mailings from other organizations, please attach the mailing label from this magazine (or copy the label *exactly*) and mail it to:

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NEW PROJECTS

ARKANSAS

Overflow Bottoms—Addition—(Ashley County). In cooperation with the U.S. Fish and Wildlife Service, the Conservancy has acquired an additional 1,884 acres (2,127 were purchased in 1980) of prime migratory bird habitat along the lower Mississippi floodway. Two interest-free loans—one from the Winthrop Rockefeller Foundation of Little Rock and the other from the State of Arkansas—fueled the project, which includes a contract to purchase an adjacent 2,413 acres within the coming year. The federal Migratory Bird Commission has set aside funds for the creation of a 6,424-acre national wildlife refuge (hardwood swamps, high and low floodplains here in southeastern Arkansas) once Conservancy acquisitions are complete.

COLORADO

Conrad Prairie Chicken Preserve (Yuma County). These are courting grounds for *Tympanuchus cupido,* the state-endangered greater prairie chicken. And what a show each spring when the birds meet on this 240-acre stretch of sandhill prairieland to mate. The males display and strut—filling the air with a deep, hollow booming that reverberates through orange-skinned neck sacs. A gift of Mrs. Marguerite Conrad, these gentle hills and swales with their sandsage communities also host prairie dogs, pronghorn antelope, mule deer, burrowing owls, and lark buntings. Notable as the state's only protected habitat for the greater prairie chicken, the new preserve will be managed by the Colorado Field Office.

FLORIDA

Dog Island (Franklin County). It's a barrier island 20 miles off Florida's Gulf Coast: 1,600 acres of big dunes (the highest on any of the state's islands), slash pine scrub and flatwoods, expanses of spartina marsh, freshwater sloughs. . . . There are nesting grounds for federally endangered leatherback and federally threatened loggerhead sea turtles, as well as the state-threatened southeastern kestrel and American oystercatcher. The Conservancy averted intensive development here through a series of complex negotiations involving purchase of the owning real estate company (in a $2-plus million stock transaction). The property constitutes 75 percent of the island, which lies in a chain of islands within the Apalachicola Bay National Estuarine Sanctuary. The Florida Field Office has a fundraising goal of $2.5 million for the project, which is slated for transfer to the Dog Island Conservation District.

Sand Hill Project, Hobe Sound National Wildlife Refuge—Addition—(Martin County). With the acquisition of an additional 4.5 acres, the Conservancy has enhanced the existing refuge with a healthy remnant of exceptionally mature sand pine scrub: the state's oldest plant community type, and arguably its richest in rare species. Heavy development along Florida's east coast has all but eliminated the scrub communities that once cloaked relict beach dunes for miles. This property supports jeopardized plant species (beach creeper, which is threatened in Florida, scrub mint and Indian pipe, which are candidates for federal protection) and provides habitat for the state-threatened gopher tortoise and rare Florida scrub lizard. It will be conveyed to the U.S. Fish and Wildlife Service for management. (The Sand Hill Project will span 61 acres when complete.)

ILLINOIS

Island Lake Park (Lake County). The last parcel of open land on a man-made lake in northeastern Illinois, this half-acre property was acquired under an agreement with the Fox River Conservation Union to help local government units with open space projects. It has been leased to the Village of Island Lake for management.

Lower Cache River (Pulaski County). It looks like Louisiana—a mazy expanse of swamps and sloughs with stands of huge bald cypress trees (many over 1,000 years old) and tupelos; but it's southern Illinois. A six-mile stretch of land along the river, of which this 196-acre property is part, was recommended for protection by the Illinois Natural Areas Inventory. Acquired through a land-exchange agreement, the tract boasts the largest bald cypress tree in the state, second largest in the nation, as well as rare flora (swamp loosestrife, Clingman's hedge nettle, Virginia snake root, mock orange, water elm, and water hickory). And these are breeding grounds for green tree frogs, nesting grounds for migratory waterfowl. The Illinois Field Office is responsible for management.

Spring Grove Fen (McHenry County). Listed by the Illinois Natural Areas Inventory as a high-quality wetland community, this 6.3-acre sedge meadow crossed by spring runs skirts a creek within a larger grassy fen. Several plants uncommon to this portion of northern Illinois abound here: hoary willow, sweet Indian plaintain, and water parsnip among them. The property was protected in cooperation with the McHenry County Conservation District, which will manage it as a natural area.

INDIANA

Hoot Woods (Owen County). Designated a national natural landmark in 1973, this remnant of Indiana's pre-settlement forestland lies in a "tension" zone between beech-maple and oak-hickory forest types: that is, an area where the two compete for dominance in suitable soil and weather conditions. Miss Alice Hoot, whose family has owned the woods for more than a century, donated a conservation easement on 82 acres here—a gentle east-facing slope drained by an intermittent stream. The property is listed on the Indiana Registry of Natural Areas.

MICHIGAN

Crow Island State Game Area (Saginaw and Bay Counties). A 537-acre marshland on one of Michigan's major hawk and eagle migration routes, this property has been a top acquisition priority for the state's Department of Natural Resources. Its abundant waterfowl population includes American coots, mallards, blue-winged teal, and great blue herons. The land, which lies in a rapidly developing area between Saginaw and Bay City, will be annexed to the adjacent game area and managed by the Wildlife Division.

MINNESOTA

Partch Woods—Addition—(Stearns County). Buffering the existing preserve to the south, this 40-acre tract of wet meadow (bluejoint grass with willows) and woods is a gift of Max and Frances Partch. Prized for its thriving sugar maple-basswood community, rare in this part of the state, the dense and shady woods support an array of spring ephemerals (trout lilies, Dutchman's breeches, and spring beauties among them) as well as other plants. The 124-acre preserve is managed by the Minnesota Chapter in cooperation with the state's Scientific and Natural Areas Program.

MISSISSIPPI

Pearl River—St. Regis Property—(Pearl River County). In concert with the State of Mississippi and the U.S. Fish and Wildlife Service, the Conservancy is seeking to safeguard some 40,000 acres of prime southern bottomlands near the Pearl's confluence with the Bogue Chitto River. The acquisition of this 10,563-acre property—mixed hardwood forest interlaced with streams, sloughs (like the great, slow-moving Dead River), and oxbow lakes—completes conservation of a 15,000-acre area charted for state management. (An adjacent 2,644-acre tract was purchased and transferred earlier this year.) Hosting some 45 species of mammals—including black bear and bobcat—150 birds, and 13 reptiles, this East Gulf Coastal Plain property will be managed by the Mississippi Department of Wildlife Conservation. Because the Pearl is targeted for protection under the Rivers of the Deep South Program, a $3.5-million loan from the Richard King Mellon Land Preservation Fund was used to cover acquisition costs. Thanks go to the St. Regis Paper Company, which sold the property to the Conservancy at less than its appraised value.

NEW YORK

Griffith Preserve—Addition—(Suffolk County). Another gift of Eleanor B. Griffith, this two-acre tract brings preserve acreage to 14.5. A wild remnant of Long Island's south shore, the preserve is noted for its mature oak-hickory forest and its tidal marsh. The Long Island Chapter is responsible for management.

Mashomack—Addition—(Suffolk County). Two-and-a-half acres in the Pine Swamp portion of this premier preserve on Shelter Island boast mocassin flowers and whorled pogonias, two locally rare orchids. They flourish here in a wetland environment—though they're usually found in the acidic soils of upland woods. Rare shrubs include mountain holly, which occurs on only five Long Island sites. The preserve, now 2,039 acres in extent, was established in 1980: a green peninsula of remarkable biotic diversity at the edge of America's biggest megalopolis.

Thousand Acre Swamp—Addition—(Monroe County). Half forested swamp and half drier woodland, this key 44-acre parcel lies at the core of the preserve: an Ice Age remnant supporting some 50 wildlife species and more than 500 different plants, representing 80 families. Embracing part of a pond and a feeder stream, protection of the tract boosts watershed integrity and links other parcels in the Conservancy assemblage, now 223 acres in area. It was purchased with existing acquisition funds by the Thousand Acre Swamp Com-

General Davis Cave

It's all happening underground: a cave system half a mile deep with a treasure-lode of rare fauna. Here in southeastern West Virginia, a bowl-shaped limestone ravine holds the new preserve—a one-acre gift of land bearing both cave entrances (and a conservation easement on the entire cave system) from George A. and Helen Aide and John and Caroline B. Beury.

Enter the cave's mouth and crawl in about 15 feet. You're in a vast room (some 200 feet deep, 100 wide, 25 high), and where it slopes down at the far end, a dark and eerie world begins—a world of drip pools, muddy walls . . . the sounds of rushing water. Back a thousand feet, you'll come to the stream passage itself; ankle-deep at its shallowest, it can rage above head height some days, filling the cave with its roar.

Water from where? It comes in through a natural siphon out of Sinks-of-the-Run, a nearby cave that's fed in turn by a surface stream on Muddy Creek Mountain. And what makes it so important is its role as a nutrient source for General Davis Cave's biota—and more specifically, two species found here and nowhere else on Earth: *Gyrinophilus subterraneus,* a troglodytic (cave-dwelling) salamander, and *Pseudanophthalmus lallemanti,* a tiny endemic beetle. But that's not all. There's a cave scud (an amphipod named *Stygonectes spinatus*) that is rare in the state, uncommon nationally, and a wintering population of federally endangered Indiana bats (*Myotis sodalis*).

Nominated for national natural landmark status by the West Virginia Heritage Trust Program, General Davis is ranked by scientists to be among the most biologically significant caves in the entire Appalachian Region. The West Virginia Field Office, which manages the area, plans to place a gate within the cave to safeguard critical habitat beyond. Negotiations are in progress to protect surrounding deciduous woodlands as well—some 300 acres near the Greenbrier River—since maintaining watershed integrity is critical to the cave's habitat. What's happening above-ground matters too.

mittee, which manages the preserve in cooperation with the Western New York Chapter.

NORTH CAROLINA

Bat Cave (Rutherford and Henderson Counties). Less important for the "bat" in its name than the "cave," this may be the largest fissure gneiss-granite cave complex in the world. Both the subterranean and above-ground portions of the 93-acre tract, which embraces all major entrances to the cave, are rich in biological complexity—supporting a range of communities from those that tenant dark and twilight cave zones to those in bouldery aquatic areas. Four invertebrate species that are new or undescribed occur here: a troglophilic spider (*Nesticus sp.*), an amphipod (*Stygonectes sp.*), a milliped (*Pseudotramia sp.*), and a crane fly (*Chionea sp.*). The cave also provides habitat for two salamanders of state concern: the green and a specialized population of the Yonahlossee. Under the terms of a management agreement between the Conservancy and the property owners, access is strictly controlled to safeguard these species. Bat Cave was identified by the North Carolina Heritage Program as a top protection priority in 1977.

East Flat Rock Bog (Henderson County). The news here is *Sagittaria fasciculata* or bunched arrowhead, a federally endangered plant species endemic to the Carolinas. Railway ditches provide this open, sloping half-acre with an almost continuous seepage flow of cool water, sustaining the only remnant of a bog system that covered hundreds of acres before drainage and development changed the landscape. A management agreement between the Conservancy and the Southern Railway Company, which owns the tract, calls for establishment of a protection committee and periodic inspections of the area to check the status of the state's only bunched arrowhead population.

Nags Head Woods—Addition—(Dare County). With a six-acre acquisition in the forest's biological heartland, and a lease on a town-owned 260-acre tract to the south, Conservancy protection now spans 539 acres. A national natural landmark lodged among the back barrier dunes of North Carolina's Outer Banks, this unique ecosystem is fostered by the convergence of warm Gulf Stream waters and cold currents from Labrador. Northern and southern plant species coexist, many at their geographic limits. The preserve's spectrum of wetland communities (freshwater ponds, swamp thickets, subterranean reservoirs, brackish marsh) and its oak-hickory forest harbor a number of state-endangered birds and plants. Nags Head Woods is managed by a professional Conservancy preserve steward.

OHIO

Cave Hollow—Addition—(Adams County). The purchase of this 45-acre parcel, located downstream from the preserve's deep cave, brings protected acreage here to 75. A wintering spot for the federally endangered Indiana bat, and one of two Ohio sites for the Allegheny packrat, Cave Hollow is high on the Ohio Natural Heritage Program's priority list. Several state-listed plants—species that are rare, threatened, or potentially threatened in Ohio—occur here as well (slender blazing-star, lesser ladies' tresses, American columbo, and false gromwell), some of them in scattered prairie patches. The new parcel will be transferred to the Cincinnati Museum of Natural History for inclusion in the Edge of Appalachia Preserve System: a 12-mile long assemblage of seven southern Ohio natural areas to which the Conservancy has devoted acquisition efforts during the past two decades.

TENNESSEE

Summitville Mountain Spring (Coffee County). The world's only population of barrens topminnows (*Fundulus sp.*) inhabits a quarter-acre pond belonging to Mr. and Mrs. Joe R. Banks of Morrisson. Through an innovative management agreement drawn up by the Tennessee Wildlife Resources Agency, the Conservancy, and the Banks family, a one-acre area embracing the pond—which was formed by the damming of a cave spring at the base of Summitville Mountain—has been safeguarded. An added bonus is the presence of flame chubs (*Hemitremia flammea*) and redband darters (*Etheostoma luteovinctum*), two fish species with limited distributions in the state.

VERMONT

Camel's Hump Forest Reserve—Additions—Washington County. Three remote inholdings totaling 315 acres extend this scenic forest reserve: high elevation spruce-fir woodlands in the Green Mountains, just south of Camel's Hump. The summit of Mount Ira Allen and portions of the Long Trail (part of the Appalachian Trail System) are encompassed by one of the additions, a steeply sloping tract with many areas of exposed bedrock. The lands were transferred to the Vermont Department of Forests, Parks, and Recreation for management, as were 315 acres donated to the Conservancy by the International Paper Company in 1980.

Thirty-first Annual Meeting & Conference

Deep in December it's nice to remember the kind of September. . . . At the Conservancy's Thirty-first Annual Meeting and Conference, more than 350 members and staff people gathered in Monterey, California, to take part in the seminars, field trips, and workshops designed by a committee of California volunteers. Field trips before, after, and during the meeting explored vast Santa Cruz Island, tide pools, sand dunes, Elkhorn Slough, and the dramatic coast at Big Creek. "An Evening in Old Monterey" unfolded under the stars in the courtyard of an historic adobe to the strains of a mariache band; there was a balloon-bedecked "idea exchange luncheon," and an Annual Awards Banquet addressed by Dr. Paul R. Ehrlich, (ecologist, educator, and co-author of *Extinction*). These were just a few of the three-day meeting's events. Mark your calendars now for next year: October 1 and 2 of 1982—when the Conservancy's Thirty-second Annual Meeting and Conference will take place in Washington, D.C. And in '83, it's October 20-22 in Tucson, Arizona.

LETTERS TO THE EDITOR

Editor's Note: As we noted in the September/October issue, our July/August 30th Anniversary Issue contained only a sampling of Conservancy reminiscences—by no means an official history—and many who played vital roles in the organization's history were inevitably omitted. While space will never allow recalling them all in a publication of our character and scope, we are happy to print excerpts from letters received about the Anniversary Issue to recall at least a few of those key figures.

While the July/August issue of *The Nature Conservancy News* establishes some worthwhile points, its emphasis does an unwarranted injustice to some of those persons who made the Conservancy what it is today.

Take George Collins, for example. With the help of Doris Leonard, he brought the Conservancy its first satisfactory project on the West Coast, doing himself all the necessary work to spare the Conservancy's small staff, raising the interim financing (which the Conservancy could not have done at that time), and earning the Conservancy a fee of about $40,000, the first significant money it had obtained on the West Coast. He then agreed to serve as president with the express purpose of continuing the reorganization of the Conservancy's West Coast operation. He also strongly supported, against the opposition of many board members, the plan that brought the Conservancy the Ford Foundation's first grant. This was a tough job and very important—for on it depended the ability of the Conservancy to continue.

Or take the case of Cary Bok, who, crippled by one illness and dying from another, for several years donated half the Conservancy's operating expenses. He told me he thought gifts that size (they eventually reached $100,000 a year) should be put to more permanent use, but I persuaded him the operating budget was the Conservancy's most pressing immediate problem.

Or what about Walter Boardman? When I became president of The Nature Conservancy, its affairs were in such a distressing condition that I would not have taken the post if I had been better informed. In a short time, the executive director resigned. The top salary the Conservancy could pay a replacement was $8,000. Even in those days before rampant inflation, this was a pittance. But Walter Boardman agreed to accept the job.

Here are just a few of the Conservancy's accomplishments in the next two years . . .: It inaugurated its government cooperative program, which not only brought in needed revenue but greatly enhanced its reputation. (When I secured Laurence Rockefeller's first $50,000 donation to the Conservancy, it was largely on the basis of this program.) It began a thorough re-organization of its West Coast operation (later continued by George Collins), in spite of much opposition from the board, and brought the chapters into the organization as a whole. Furthermore, it more than doubled the amount of land it had saved in the previous eight years, more than doubled its operating income, and more than doubled its capital funds. I think you will agree that was quite a record, and it started the Conservancy as you know it today. It would have been absolutely impossible to have achieved those results without Walter's devotion, loyalty, and hard work for an insufficient salary.

And there were several others, whom time prevents me from mentioning, but whose contributions were also great.

The organization did not, as the article implies, attain its present importance as the result of the rise in conservation awareness, the publication of *Silent Spring,* or through luck. It was well on its way to success before conservation became widely popular. And it was not luck that it was the only national conservation organization that had a plan ready when the Ford Foundation considered entering the field. Nor was it luck that it obtained the largest grant ever made to a conservation agency for operating purposes in the history of the United States. Nor that it alone developed a government cooperative program that attracted wide interest and support. Nor that this program was instrumental in persuading Congress to continue the Land and Water Conservation Fund despite the land speculators. Nor that the Conservancy developed sophisticated techniques for handling money that were unique among non-profit agencies. Nor that it abandoned the typical conservation emotionalism it once practiced, thus gaining a reputa-

tion for moderation that made it possible for it to deal with groups that ordinarily closed their doors to conservationists. Nor that it successfully applied business principles to the conservation cause. Nor that it developed entirely new ways of saving land, methods that are now used by many others. . . .

Alexander B. Adams
Rowayton, Connecticut

Alexander Adams served on the Conservancy's Board of Governors from 1960 to 1972. He was president from 1960-62 and chairman of the board from 1966-69.

◈

Two men are responsible for the Conservancy being in operation today. One, George Cooley, is recognized, although I don't think sufficiently. The other, Alexander Adams, is not. To those of us who were there, there would be no excuse . . . not to state the facts of history that Adams was the father of business management, forward planning, and the man with the guts to take the calculated risks that brought it to its great success during the period. I don't believe I have to list here his accomplishments. They are in your records. Without him there would have been no Conservancy!

E. R. Kingman
Lewes, Delaware

E. R. Kingman was vice president of the Conservancy from 1968 to 1971.

◈

I wonder why there is no reference to The Ford Foundation or to Gordon Harrison . . . in the 30th Anniversary issue of the *News*.

In the early sixties, when I was a Trustee of The Ford Foundation, it was decided that, in addition to Resources for the Future, which the Ford Foundation had supported for some time, conservation as such should be added to the Foundation's agenda, and Gordon Harrison was employed to head a new division called Resources and Environment. Thanks I think to my acquaintance with Richard Goodwin, the Conservancy was soon identified as a potential candidate for a grant. My recollection is that I met Goodwin in connection with establishment of the Frederick Walcott Preserve in the Town of Norfolk, Connecticut, and that he and I explored the Silas Hall area adjoining property which I subsequently deeded to the Conservancy.

I believe that Harrison's confidence in the basic strength of the Conservancy led to some changes in the management of its affairs which helped it to qualify for a grant; and this led to a substantial grant to provide a revolving fund for use in the early identification and acquisition of rights and properties thought to be attractive to the Conservancy.

Bethuel M. Webster
New York, New York

The Ford Foundation's contributions to the Conservancy's operating fund in the mid and late 60's and its challenge grant to the Project Revolving Fund in 1971 played a vital role in the Conservancy's development.

◈

A minor matter, but wasn't the picture taken of V. E. Shelford, Richard Goodwin, and Richard Pough (July/August, p. 17) made in 1956 and not 1965? Dr. Shelford visited us that year, the year of the A.I.B.S. meeting in Storrs. . . .

In any case, thanks for carrying the photograph of three people that I knew and liked.

Ralph M. Wetzel
Storrs, Connecticut

The photo was indeed taken in 1956.

◈

I can't tell you how much I enjoyed the 30th Anniversary Issue. It took me back a long way in time. I've been a member since the days when our Connecticut Chapter of the Garden Club of America took up the cause of Mianus Gorge. I asked Dick Pough to come and talk to us. He was so enthusiastic! We all caught fire! . . . I've been an ardent advocate ever since. What a wonderful service the Conservancy has performed for us all. . . .

Marjorie Churchill
Phoenix, Arizona

PHOTOS: Jon Farrar, pp. 10-15; Charles Ott, p. 7 top, 16; Scott Robertson, p. 26; Timothy H. Sharp, pp. 17, 19 bottom, 21; R. Hamilton Smith (Earth Imagery), p. 6, inside front cover; Steven C. Wilson (Entheos), pp. 4, 7 bottom, 8, 19 top.

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